

OUR BOOK SHELF.

Questions and Examples on Elementary Experimental Physics. By Benjamin Lœwy. (London: Macmillan and Co., 1888.)

THIS book contains some 470 questions and examples in elementary physics, selected from the various papers set by the author for the examinations of the College of Preceptors. The questions are arranged under the four sections, sound, light, heat, and electricity and magnetism, and are further subdivided in each section into groups of five or six, with the suggestion that each group should form the subject of an ordinary school lesson. Problems involving a knowledge of mathematics beyond elementary arithmetic and geometry are avoided; in other respects the general standard of the questions is about that of the advanced stage of the Science and Art Department's examinations. The questions are well selected, and free from ambiguity or repetition. We notice under Heat, ix., 1, the question: "In the process of graduating a thermometer, why must the freezing-point be determined before the boiling-point?" This is the order of operations as usually given in the text-books, but it has been shown in the elaborate report of the Bureau des Poids et Mesures that the interval between the freezing and boiling points is most constant when the freezing-point is determined as soon as possible after the boiling-point.

We can recommend this little book to the attention of those teachers who have to prepare pupils for the public examinations in elementary physics. For success in such examinations it is not sufficient that the pupils should possess the requisite amount of knowledge: they must also acquire the power to express their knowledge clearly and concisely on paper, and such power it is one of the functions of such a book as this to impart.

H. H. H.

The Unknown Horn of Africa. By F. L. James, F.R.G.S. (London: G. Philip and Son, 1888.)

THIS is an extremely interesting record of an exploration from Berbera to the Leopard River, undertaken about four years ago. Various attempts had been made, before Mr. James's journey, to penetrate to the interior of Somali Land, but without success. Mr. James and his companions, more fortunate, or more skilful, than their predecessors, contrived to push their way to the goal for which they started; and the result is that the present volume is accompanied by a map embodying much new information regarding a district of considerable extent and importance. Some of the difficulties encountered by the party were formidable, but courage and perseverance enabled the travellers to overcome every obstacle. Mr. James has much to tell us about the flora and fauna of the country, as well as about its physical features; and he has many lively and instructive passages describing his relations with the natives, whose peculiarities he seems to have thoroughly understood. The story is itself so interesting, and is told in so bright and pleasant a style, that the book ought to be one of the most popular of recent works of travel. It is illustrated by a number of excellent coloured plates, and by various effective pictures, composed from photographs of natives and native scenery taken on the spot.

Seas and Skies in Many Latitudes. By the Hon. Ralph Abercromby. (London: Edward Stanford, 1888.)

THIS is not an ordinary book of travels. It has been written mainly for the purpose of calling attention to such phenomena of the sky and weather as Mr. Abercromby has observed in various parts of the world. The opening chapter describes the author's experiences in Canada and the United States in the year 1865. Then he gives an

account of a voyage round the world, beginning with what he saw in Egypt, and passing on to descriptions relating to Australia, New Caledonia, Fiji, New Zealand, Cape Horn, and Rio Janeiro. Mr. Abercromby next takes his readers within the Arctic Circle, and afterwards he tells of a long journey, in the course of which he was at the Cape of Good Hope, Mauritius, Ceylon, the Himalayas, Borneo, Manila, San Francisco, and Washington. He by no means confines his narrative to matters specially attractive to meteorologists. He takes interest in many different classes of subjects, and has something more or less memorable to record about almost all the places he has visited. It is, however, meteorology that he keeps chiefly in view, and we need scarcely say that on this subject, which he has so long and carefully studied, his book is always fresh and instructive. The value of the work is increased by good maps and illustrations.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

Alpine Haze.

WITH the caution of a true man of science, Prof. Tyndall has given this name to a phenomenon observed by him in the Alps. Does not W. Clement Ley beg the question by calling it "dust-haze"? I should translate his *nebula arida* by "dry haze."

Two hundred years ago, Ludolf gave the best definition of *qobar* by translating it: "*opacitas aeris qualis solet esse tempore fervidissima aestatis.*"

In my last letter I quoted several names of it, in order to show that the vulgar eye has long distinguished this phenomenon. I have since learnt that, in the Basque dialect of Gipuzkoa, its proper name is *bisuntsz*, but that seafarers call it *lur-aulsa*, i.e. "earth-haze," *lañoa*, meaning common fog. The Ethiopic name, *qobar*, comes from *gabbara*, a root extant also in Hebrew and Arabic, and meaning to bury. *Qobar* hides the landscape, and conceals stars of the third magnitude, even in the zenith. Gasparin observed it on Mount Ventoux, where he crossed a thick cloud which made no impression on his hygrometer. Humboldt, viewing *qobar* in Peru, says, "Quelle est cette vapeur qui est visible et qui ne mouille pas?" but leaves his question unanswered.

While travelling in Spain, Willkomm remarked *qobar* at a distance of 3 or 4 miles, yet, on reaching the actual spot, he saw nothing. He clearly distinguished it from the *landrauch* ascribed to smoke caused by turf burning in Westphalia, and thinks, like Spaniards, that *callina* increases with solar heat. Several German authors have spoken of this phenomenon as smoke, but Egen is the only one who has followed it up from place to place through an extent of 200 kilometres, and rendered it probable that it then covered a space of more than a thousand square myriametres. It seems, however, that particles of smoke should attract moisture, if there were any in the air, and then form real clouds or otherwise fall to the ground by increase of weight.

Bravais saw *qobar* on the Faulhorn, when his hygrometer was at 51, air saturated with moisture marking 100. In Ethiopia, where I have observed it so low as 20, the hygrometer's mean reading was 41 when *qobar* was conspicuous. Above 72 it disappeared. These figures apply to the place of observation. Conclusions can be safely drawn only when the air's moisture shall have been measured in several places along the line of sight up to the spot where *qobar* prevails, or, better still, in that spot itself when recognized from a distance.

Since I published my first account of *qobar*, Martins, who observed it in Auvergne, Switzerland, and from Mount Canigou, is the only author who has specially described it. He says that the Swiss call it *hâle*, and that he saw none of it in Lapland. In spite of Kaemtz's remark that, moisture being the essence of all fogs, a "dry fog" is an expression not less un-

meaning than a "triangular square," Martins divides his "*brouillards secs*" into four classes, viz. volcanic ashes as seen in the year 1783; smoke from turf or stubble fires; *callina* or *gobar*; and a fourth kind established on negative evidence which seems untrustworthy.

W. Clement Ley has described quite well the hues of *gobar*. It is light buff when near or slight. Otherwise, its colour is a lurid gray verging to blackness. Whatever may be its connection with cumuli in England, I could detect nothing of the sort in Ethiopia, where I have watched *gobar* for whole weeks without any ensuing rain or even cloud.

Four years ago the French transit of Venus expeditions agreed to investigate the amount of carbonic acid gas in the air of their several stations. Mine was in Hayti, where *gobar* was rife, and while observing for many consecutive hours the passage of air through caustic potash in prepared tubes, I regretted their not being made to receive plugs of loose cotton in order to collect smoke, dust, or microbes. All the tubes having been subsequently tested in Paris by Prof. Müntz, he obtained the unexpected result that air contains more carbonic acid in the southern hemisphere than on the north of the equator. Those tubes inclosed also fragments of pumice-stone previously steeped in sulphuric acid in order to collect moisture. With a little care and trouble next summer in a spot of Southern Europe where *gobar* abounds, meteorologists might soon get an insight into its true nature.

January 3.

ANTOINE D'ABBADIE.

SEVERAL communications have appeared in NATURE on the subject of atmospheric haze. It would be interesting to know whether the writers consider the haze which they have described as identical in substance with that which I would call *ordinary* atmospheric haze. The haze of these writers is a haze taking the visible form of layers or bands. The haze to which I refer has under ordinary circumstances no visible form at all. We are conscious of its presence by its effect in diminishing the transparency of the air. Everyone knows that, quite apart from fog, or smoke, or dust, or low cloud, or falling rain, the transparency of the air varies very greatly at different times. In our climate there is nearly always more or less of atmospheric haze, the rare exceptions proving the rule; and the haze may be so dense as to render terrestrial objects invisible at a distance of a very few miles. Celestial objects may also be obscured by the same cause. Not to speak of the varying brightness and varying colour of the sun at sunset (in the production of which effects another cause may co-operate), there are occasions on which the sun long before sunset is shorn of his beams through the intervention of a low general haze, the hygrometric conditions at the time being such as to preclude the idea of fog, to which indeed the haze referred to bears little resemblance.

On July 24, 1868, I witnessed from the summit of Snowdon a curious effect of this diffused haze. The day was cloudless. Overhead the sky was clear and blue, but at lower altitudes it was hazy, and the haze gradually thickened towards the horizon, where it terminated in an opaque brown ring, which encircled the mountain and shut out from view all objects beyond a distance of about 15 miles.

The nature of atmospheric haze has not, I think, hitherto been satisfactorily elucidated, and it is much to be desired that advantage should be taken of some occasion when the haze is exceptionally dense, for the application of the various methods of research which modern science has rendered possible.

Clifton, December 25, 1888.

GEORGE F. BURDER.

On the Use of the Words "Mass" and "Inertia"—a Suggestion.

As a teacher of dynamics to Engineer Students, I followed with interest the discussions in NATURE, as to the use of dynamical terms, that have taken place within the last two years, and have recently re-read the whole correspondence with care. Two points seem to me to have been not quite sufficiently brought out.

(1) Physicists and teachers of dynamics, however careful they may desire to be, use the word "mass" in two senses: (1) in the old, non-scientific, (Johnsonian) sense of a "lump of matter," and (2) in the precise scientific sense of the "inertia" of a lump of matter. Indeed, I suppose that no scientific man would hesitate to speak of "the inertia of a mass of matter."

The phrase "attracting mass" is universal among scientific men, when attracting "lump" would do just as well. Thus, in Prof. MacGregor's very carefully written "Kinematics and Dynamics," we find, in Art. 290, "mass" carefully defined (in the sense of inertia) as the value of a certain ratio, and in the next article the use of the word in the sense of quantity of matter is deprecated; yet, in Art. 355, we have "attracting mass" where attracting "inertia" would not do, followed, a few lines further on, by "a particle of unit mass" where "unit inertia" would serve as well.

It is this double use of the word that, I think, sometimes escapes Engineers.

Each of the words "mass" and "weight" is used in two senses, one of which is common to both, but the other not. The fact confirms very strikingly Prof. Greenhill's contention that the scientific man is unwise to attempt to limit for his own purposes the signification of a word already well established in the language. For it shows that he cannot even keep straight himself. I think myself that the scientific man ought to back out with as much grace and celerity as may be, and determine for the future to say "inertia" when he means "inertia," and to use for its numerical representation the symbol "*i*" (or perhaps "*s*"—sluggishness) rather than the symbol "*m*." The symbol "*I*" might still be used for *moment of inertia*. Such an expression as a "mass of 20 pounds" would still mean exactly what it does at present, and nothing already written would be affected by the change.

(2) The second point that I have to mention is purely a question of procedure in teaching.

The whole subject of dynamics might well be termed the study of the inertia (the "sluggishness") of matter. This is the one new property whose existence, signification, and measurement has to be brought home to the student. Now, I would urge that it does not seem reasonable to ask the student simultaneously to comprehend a new property of matter and to alter his unit of force by defining it with reference to the new property. Do what we will, our students before they begin to learn dynamics will be familiar with the notion of "force" as a "push" or a "pull," and measured in terms of "pounds" and "ounces."

I think it would be far the best plan to define the British unit of force as the weight *in London* of the standard pound lump, and the unit of inertia as that of the mass or lump on which this force generates the unit acceleration of 1 foot-per-second per second.

Thus the unit of inertia would be that of 32.1912 standard pounds, the number 32.1912 being, for brevity, throughout the teaching, written "*g*."

This would be to adopt with careful definition, by which it is rendered perfectly precise, the Engineers' unit of inertia for purposes of instruction in dynamics. It means employing a *force-time-length* system of units instead of an *inertia-time-length* system.

Such a system would be in harmony with the order of our experiences and of our ideas as we grow in intellectual stature, and with the history of human thought as written in our language, and it is unwise to wage war with our own past even under the encouraging leadership of your correspondent "P. G. T."

Perhaps I may be allowed here to deprecate the somewhat misleading effort now being made by some chemists and physicists to substitute the word "mass" for "weight" where no question of inertia is involved or dreamt of, as, for instance, in the definition of specific heat, by reference to equal masses, instead of equal weights, as if the idea of quantity of matter had not been attained quite independently of the conception of inertia, and were not in the case in question always determined by weighing.

A. M. WORTHINGTON.

Royal Naval Engineer College, Devonport,
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Eight True Ribs in Man.

IN the number of NATURE which appeared on November 1, 1888, there is a notice to the effect that "at one of the meetings of the Anatomical Society, during the session of the Medical Congress in Washington, Dr. Lamb, of the United States Army Medical Museum, spoke briefly of a singular phenomenon he had observed in his examination of human breast-bones. It was the occurrence, in a number of specimens, of an eighth rib,